





ANNUAL REPORT

1962

TOWN OF HUNTSVILLE

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TD 367 .A56 Huntsville: sewage treatment plant.

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HUNTSVILLE

SEWAGE TREATMENT PLANT

ANNUAL REPORT

1962

DIVISION OF PLANT OPERATIONS

ONTARIO WATER RESOURCES COMMISSION

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Dr. A. E. Berry - General Manager

Mr. D. S. Caverly - Assistant General Manager, and Director of Plant Operations.

Mr. B. C. Palmer - Assistant Director, Division of Plant Operations.

Mr. P. J. Osmond - Project Engineer, Division of Plant Operations.

Prepared by

The Division of Plant Operations.

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HUNTSVILLE SEWAGE TREATMENT PLANT

INTRODUCTION

On March 5th, 1957 preliminary discussions were held with officials of the Municipality of Huntsville to discuss proposals for a sewerage system for the town. A report prepared in 1954 by the Consulting Engineering firm of R. V. Anderson and Associates was updated, and on September 10th, 1958 the OWRC issued their certificate of approval for the construction of sanitary sewers, three pumping stations and a sewage treatment plant.

The construction of this project was divided into two parts, Contract "A" and Contract "B". Contract "A" consisted of sanitary sewers and was awarded to Sherk Construction Limited for \$ 147,153.87, while Contract "B" consisted of the construction of the sewage treatment plant and pumping stations which was awarded to Foundation Company of Ontario at a cost of \$ 241,871.00. The total cost of the project was estimated at \$ 389,024.87.

On November 18th, 1959, the plant was officially put into operation.



SEWERAGE SYSTEM DESCRIPTION

The sewage from the municipality is collected in a number of sanitary and combined sewers. Most of the sewage flows by gravity to one of three pumping stations from which it is then directed to the sewage treatment plant.

The sewage enters the plant through a grit removal chamber where the sand, grit and silty material is removed.

Manually cleaned bar screens are provided for the removal of large foreign objects which could possibly damage the plant equipment. From the grit channels the sewage flows to the primary clarifier.

The sewage is settled in the primary clarifier for approximately two hours before passing on to the aeration tanks. During this retention period, organic solids settle out and are collected by a travelling sludge collector and then are pumped to the digester. In the aeration section, the effluent from the primary clarifier is mixed with activated sludge from the secondary clarifier to form "Mixed Liquor". Air is introduced to the mixed liquor by two Chicago pump mechanical aerators. With properly controlled aeration, a highly settleable sludge floc is formed. The floc is allowed to settle out in the final settling tank.

The clear sparkling effluent produced in this manner flows over the peripheral weirs of the final clarifier and through a Parshall flume where the total flow is measured. The effluent then flows to the chlorine contact chamber.



During the summer months, the final effluent is chlorinated before being discharged to the Muskoka River.

The sludge drawn from the primary tank and pumped to the digester is maintained at a temperature of 90 °F for a period of 28 days. The sludge is mixed and the digester temperature maintained by continually recirculating the liquid through a heat exchanger. Under this controlled environment, anaerobic bacterial action breaks down the raw sludge to a black, odourless liquid. During the process methane gas is produced which is then collected and used to heat the digester and control building.

The digested sludge is hauled away by tank truck and disposed of on farmers' fields where it makes an excellent soil conditioner.

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DESIGN DATA

Plant

- 1. Type —Activated sludge (mechanical aeration)
- 2. Design Population-3,000 persons
- 3. Per Capita Flow -83 gallons/capita/day
- 4. Design Plant Flow -250,000 gallons/day
- 5. 5-day BOD of Raw Sewage -250 ppm. Removal 90 95%.

 Suspended solids of raw sewage -250 ppm. Removal 90 95%.

Primary Treatment

- 1. Screening
 - (a) Manually cleaned bar screens with plant by-pass.
 - (b) Provision has been made for the inclusion of a comminutor.
- 2. Grit Removal -2 parallel channels;Volume 52.5 cu. ft. each;detention time 1.9 minutes.
- 3. Primary Tank

 -1 tank 10'-0" x 30'-0" x 8'-0" side wall depth.

 Surface area 300 square feet.

 Volume 2,400 cu. ft.

 Detention period 1 1/2 hours.

 Surface settling rate-1,000 US gals/

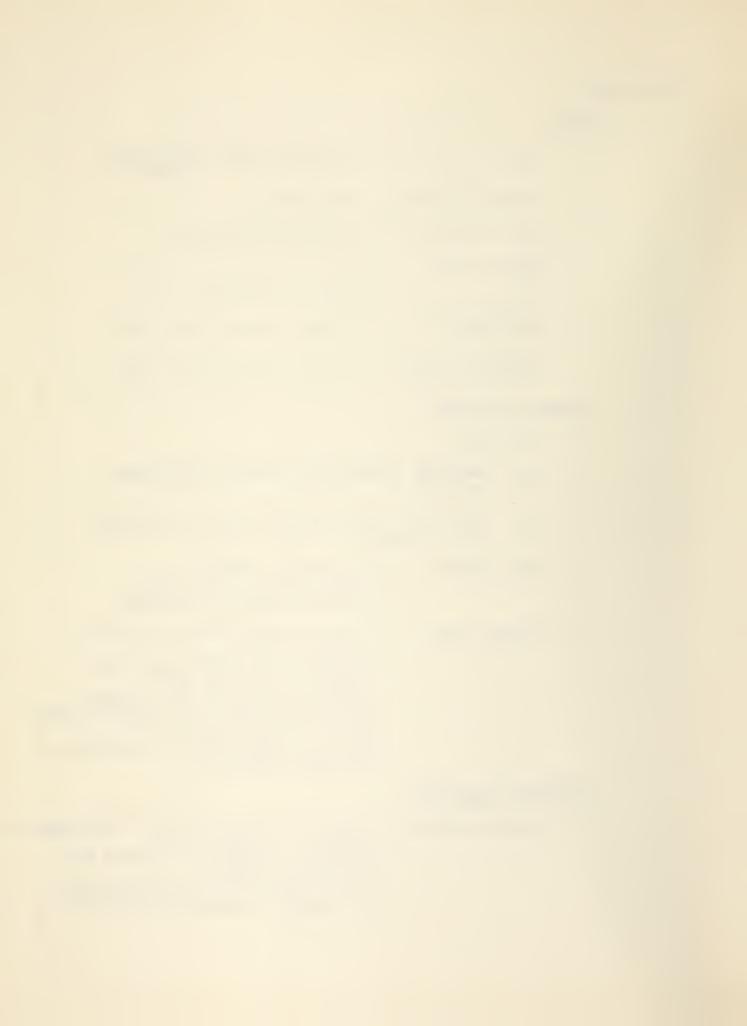
 Sq.ft. of tank/day.

 Overflow rate-33,000 US gals/ft. of

 Overflow weir/day.

Secondary Treatment

1. Aeration Section -2 tanks 24'-0" sq. by 12' SWD (approx.)
Volume - 14,000 cu. ft.
Retention period 6 3/4 hours with
25% return sludge.
8 1/2 hours with 0% return sludge.
Air supply - mechanical aeration.



Design Data (cont'd)

Secondary Treatment (cont'd)

- 2. Final Sedimentation -1 tank 30'0" x 13'-0" x 12'-0" side wall depth. Surface area 390 sq. ft. Volume 4700 cu. ft. Detention period 3 hours. Surface settling rate 770 US Gals/sq.ft./day. Overflow rate 5300 US gals/Lineal foot of overflow weir/day.
- 3. Chlorination -Maximum dosage 20 lbs./day.
 Detention period 36 minutes.

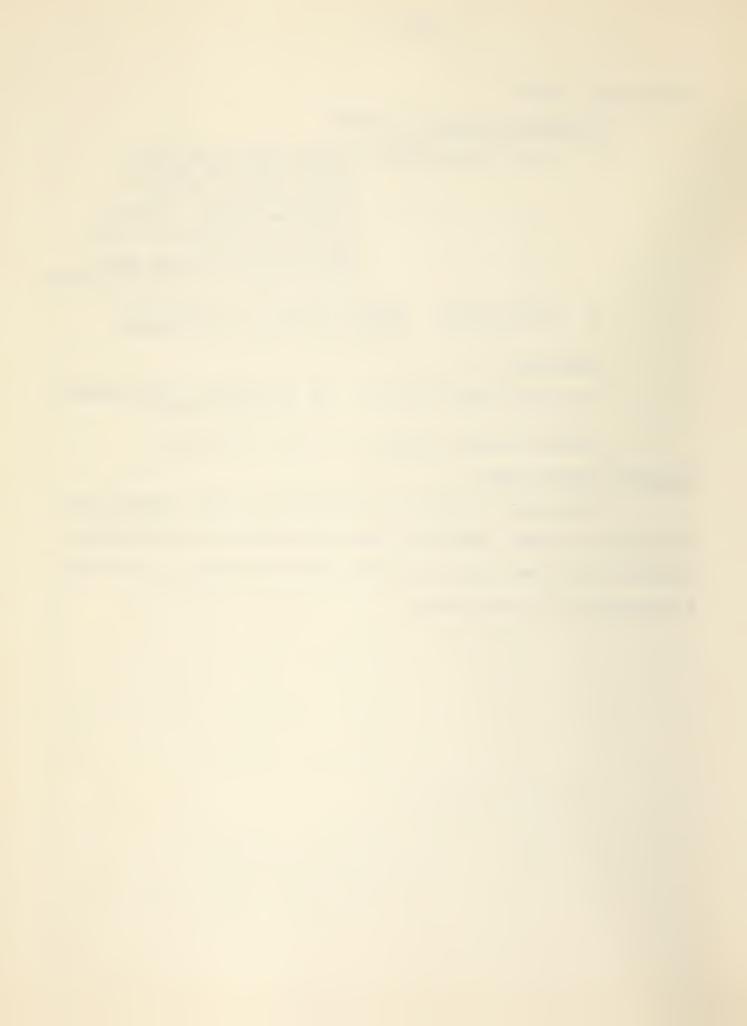
Digestion

One single stage digester - 30' diameter by approximately 20' side wall depth.

Heated digester capacity - 5 cubic feet/capita.

Additional Design Data

This plant is designed to facilitate future construction of identical primary, aeration, final and digestion tanks thereby increasing the plant capacity to 600,000 USGPD capable of serving a population of 6,000 persons.



PLANT OPERATION

The sewage treatment plant and the three pumping stations operated very efficiently during 1962. No serious difficulties were experienced since the operator, Mr. E. Diplock, was able to anticipate and solve most problems before they became critical.

Tables I to V are a summary of operating data during 1962. Included are: flow records, performance data, grit removal, power consumption and operating costs. The plant processed approximately 60 million gallons of sewage, removed 112 cubic feet of grit, consumed 4357 cubic feet of gas and 119,000 gallons of digested sludge were hauled from the digester.

The large increase in flow to the plant over previous years has enabled the plant to operate more efficiently in 1962. Table I coupled with Graph I indicates the status of the hydraulic load to which the plant is subjected. The average daily flow at 160,000 GPD is below the design flow and the plant is overloaded on a daily basis only 10% of the time. Experience has shown that even when the plant is hydraulically overloaded for short periods, the effect is not serious.

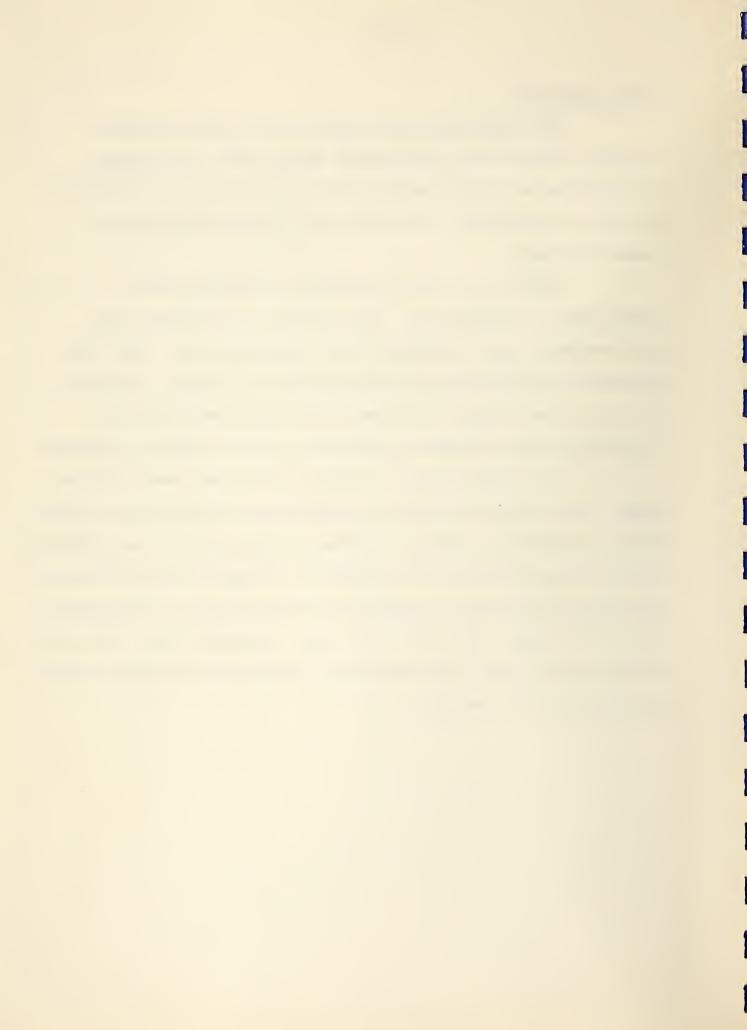
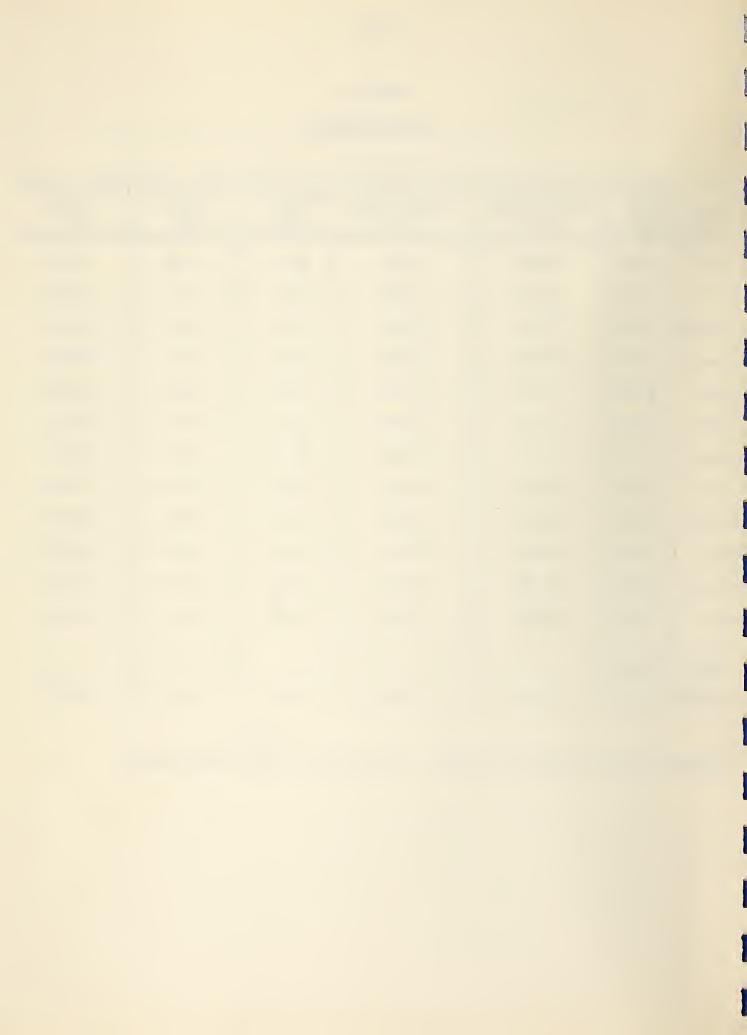
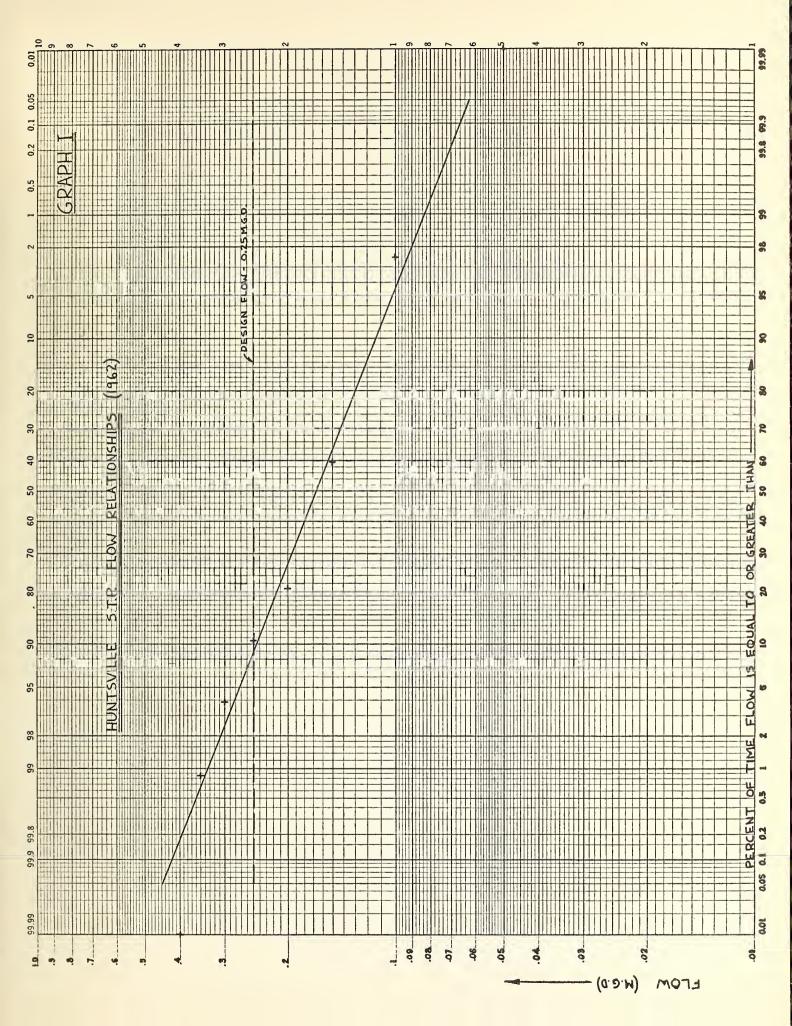


TABLE I
FLOW RECORDS

						Мійн най түй і «Мійнун үндій» і ін я барат ябін наміоння «Шійлійна» акт пункт неў «Эргу», «Паугу»
MONTH	TOTAL FLOW MG	MAX RECORDED FLOW RATE MG	MIN RECORDED FLOW RATE MG	MAX DAILY FLOW MG	MIN DAILY FLOW MG	AVG. DAILY FLOW MG
Jan.	3.65	0.46	0.01	0.13	0.08	0.12
Feb.	3.10	0.42	0.01	0.15	0.10	0.12
March	7.32	0.59	0.01	0.35	0.12	0.24
April	6.51	0.68	0.01	0.34	0.14	0.22
May	6.16	0.68	0.01	0.29	0.16	0.20
June	5.01	0.62	0.01	0.25	0.13	0.17
July	5.37	0.75	0.01	0.30	0.14	0.17
Aug.	5.10	0.67	0.01	0.23	0.12	0.16
Sept.	4.12	0.59	0.01	0.28	0.09	0.14
Oct.	4.37	0.65	0.01	0.25	0.04	0.14
Nov.	4.04	0.70	0.01	0.40	0.08	0.13
Dec.	4.83	0.60	0.01	0.33	0.11	0.16
TOTAL	59.58					
AVERAG	E 4.97	0.62	0.01	0.28	0.11	0.16

(based on - Average flow per capita per day - 54 gallons (3,000 population)





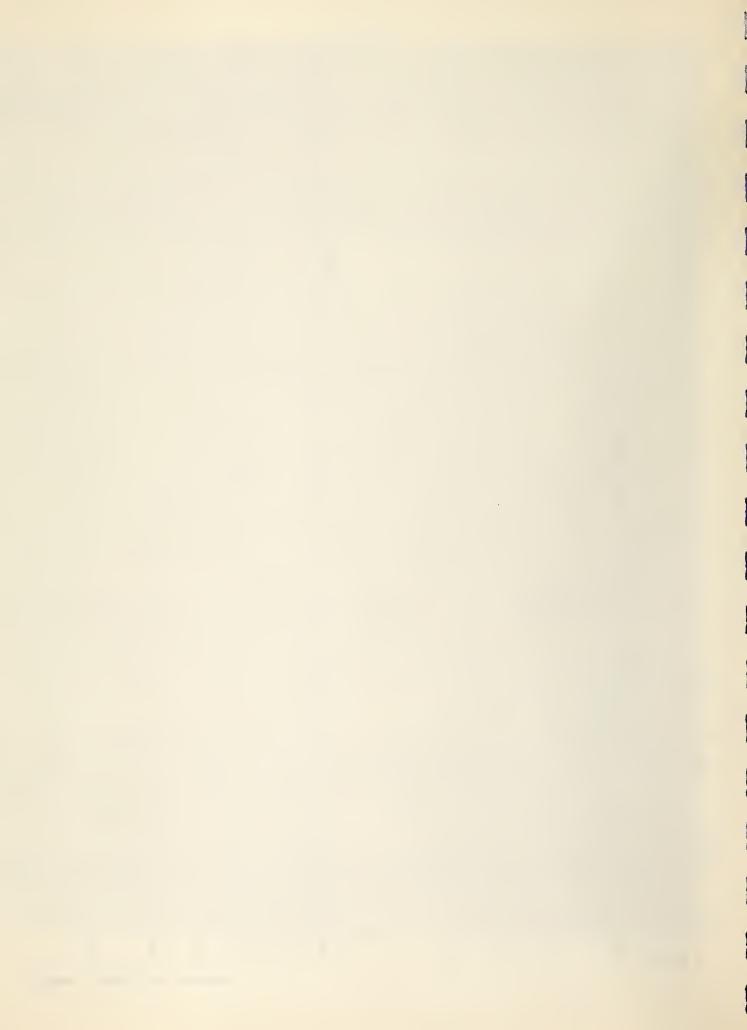


Table II coupled with Graphs II and III indicate the status of the organic loading on the plant. It is apparent that the organic loading is far below the design capabilities of the plant. The BOD and SS removal efficiency has improved and is now meeting the design expectations of 90-95% removal. Table III is an indication of the grit removed at the plant during 1962.

Both the power consumption (Table IV) and the natural gas consumption is lower in 1962 than previous years. The reduction in power can be partially attributed to modifications made in the operation of the aerators which did not operate as frequently during 1962 as in 1961. The natural gas consumption was reduced due to an increased production of sewage gas.

Table V is a tabulation of the project operating expenses in 1962. The total operating expenditures were \$8,458.91, approximately \$1540.00 under the budget.

A breakdown of the sundry expenses is as follows:

Sludge haulage	\$1,143.00
Bell Telephone	117.90
Sunshine Uniform	39.00
Petty Cash & Expenses	189.32
Insurance	37.68
Miscellaneous	84.30
	\$1.611.20



TABLE II
PLANT PERFORMANCE DATA

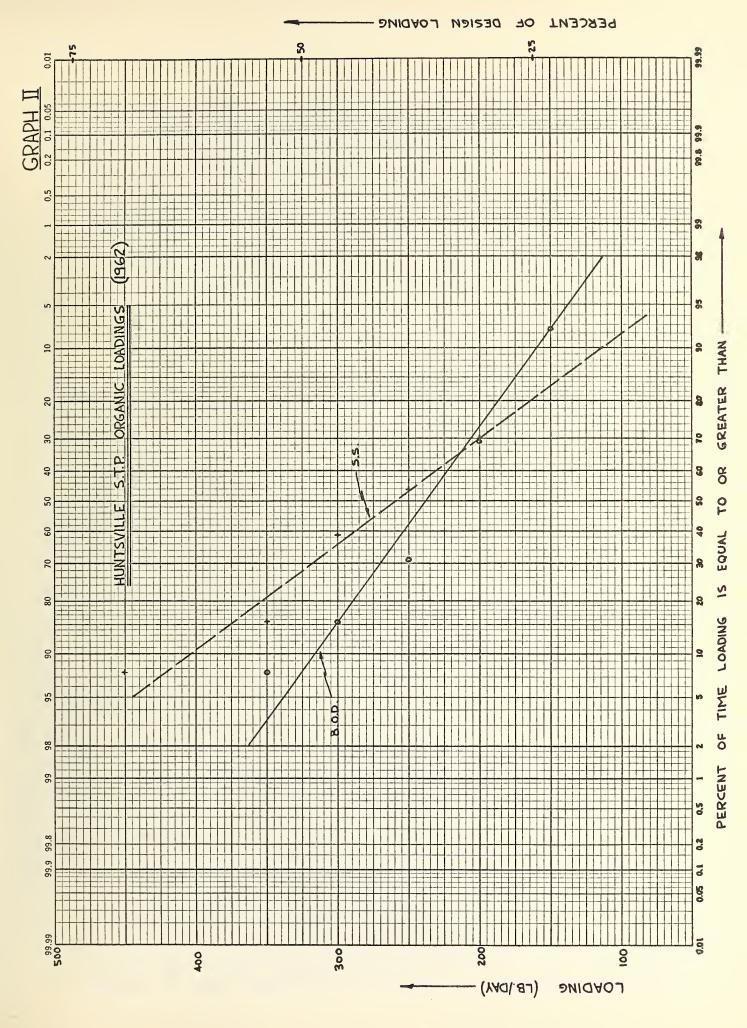
	INFL	EFFLUENT		% REMOVAL		AERATION LOADING	
MONTH	BOD (lbs)	SS (1bs)	BOD (1bs)	SS (1bs)	BOD	SS	#BOD PERIOD #MLSS
Jan.	6,750	5,780	658	438	90	92.5	11
Feb.	7,600	9,730	495	310	94	96.5	19
March	10,650	15,800	460	1175	95.5	92.5	52
April	4,880	9,620	650	2740	86.5	71.5	96
May	6,780	11,200	516	985	92.5	91.5	54
June	5,510	5,550	220	75	95.5	99	94
July	8,970	6,820	542	242	94	96	31.5
Aug.	6,380	9,700	225	815	96.5	91.5	27
Sept.	6,590	9,050	165	247	98	97.5	26
Oct.	24,000	11,000	1310	350	94.5	97	26
Nov.	8,500	6,080	1170	649	86.5	89.5	34
Dec.*	8,700	8,550	580	580	93.5	93	
TOTAL	105,310	108,880	6991	8606			
AVERAGE		9,076	583	717	93.1	92.3	43

Average BOD loading of influent
Average SS loading of influent

288 lbs/day - Design 625 lbs/day

298 lbs/day - Design 625 lbs/day







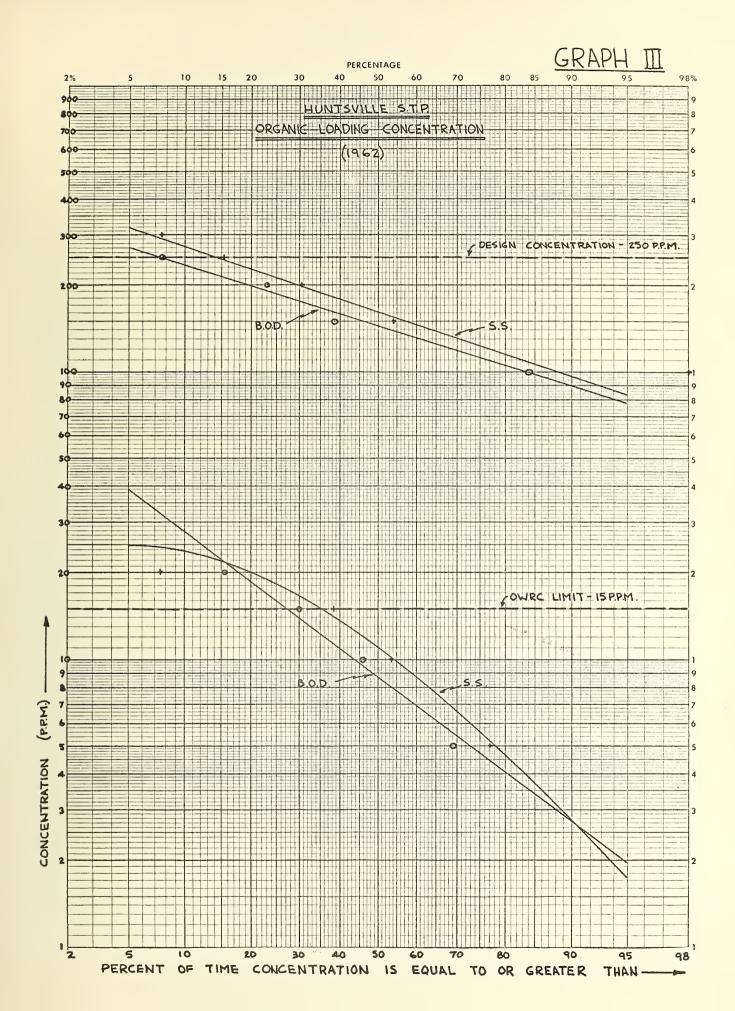




TABLE III
GRIT REMOVAL

MONTH	CUBIC FEET	CUBIC FEET/MG				
January	2	0.55				
February	0	0				
March	2	0.27				
April	13	1.99				
May	14	2.28				
June	23	4.59				
July	13	2.42				
August	18	3.34				
September	0	0				
October	8	1.83				
November	13	3.22				
December	6	1.24				
TI OTI A T	110	77 "7				
TOTAL	112	21.73				
AVERAGE	9.3	1.81				

This figure of 1.81 cu. ft./mg is slightly lower than the average for similar sewage systems.



TABLE IV
POWER CONSUMPTION

	SEW	AGE PLANT	P.S. #1	P.S. #2	P.S. #3
MONTH	KW. HR.	KW.HR./MG SEWAGE TREATED	KW. HR.	KW. HR.	KW. HR.
Jan.	7,000	1920	2310	1140	840
Feb.	5,555	1785	1760	900	560
March	6,200	845	1880	1100	450
April	5,800	890	1430	780	290
May	7,200	1170	1520	600	260
June	8,300	1645	1140	400	330
July	10,500	1960	1260	480	280
Aug.	10,700	1990	1110	540	250
Sept.	9,600	2330	1140	420	240
Oct.	7,850	1795	1340	540	530
Nov.	7,900	1955	1340	540	530
Dec.	6,750	1395	1690	900	720
TOTAL	93,355		17920	8340	5280
AVERAGE	7,780	1640	1493	695	440



SUMMARY OF COST DATA

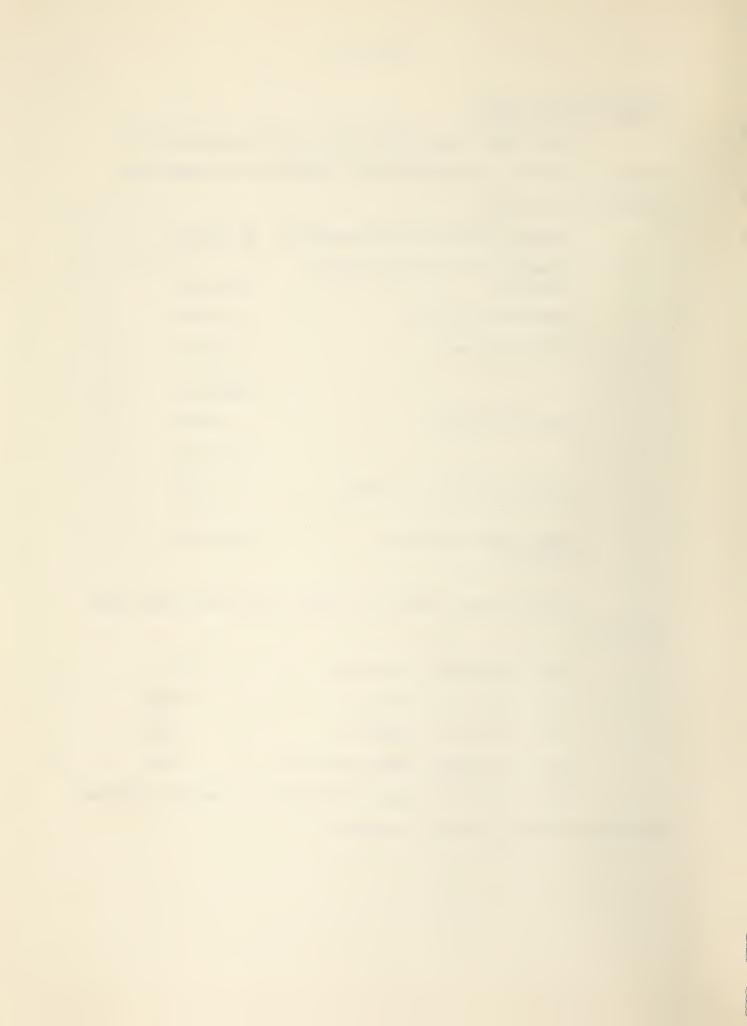
The total construction cost for the Huntsville project, 58-S-15, was approximately \$469,404.00 which was divided as follows:

Sanitary Sewers and Forcemains	\$150,954
Treatment Plant and Pumping Stations	241,643
Engineering Fees	27,296
Contingencies	23,003
	\$442,896
Less Tax Refund	4,906
	\$437,990
Add Capitalized Interest	31,414
Final Tentative Cost May 1961	\$469,404

The treatment costs for 1962 (operating only) were as follows:

(a)	Per million gallons	\$ 142
(b)	Per 1b. BOD removed	\$ 0.085
(c)	Per 1b. SS removed	\$ 0.085
(d)	Per capita (3000 persons)	\$ 2.82

The costs given above are meant for general information only as they may not be exact.



RECOMMENDATIONS

The increased plant flow has emphasized two problems which should be corrected during 1963. The first problem is the detergent foam which is formed in the aeration sections. It is recommended that a spray nozzle system be installed using effluent to control the foam build-up. This system will also be used for lawn sprinkling and washing down tanks thus greatly reducing the water consumption. The 1963 budget has allowed for the installation of this proposed system.

The purchase and installation of a comminutor is the second recommendation. This unit is badly needed to grind up and return to the flow the material which, at present, is being retained by the bar screens. At all times, the build-up of this material (rags, paper towels, etc.) on the bar screens is very heavy and required frequent manual cleaning. The removed material is difficult to dispose of particularly during the winter when it cannot be buried. At nights, when the plant is unattended, the build-up often plugs the bar screens causing at least 90% of the raw sewage to by-pass the plant and be discharged directly to the river. The cost of this recommendation will consist almost entirely of equipment costs since provision was made in the initial design for the addition of a comminutor.



DIVISION OF PLANT OPERATIONS

SUMMARY OF

\$10,000,00

BUDGET

\$ 8,458.91

ACTUAL

PROJECT OPERATION STATEMENTS

YEAR 1962

OPERATING \$ %

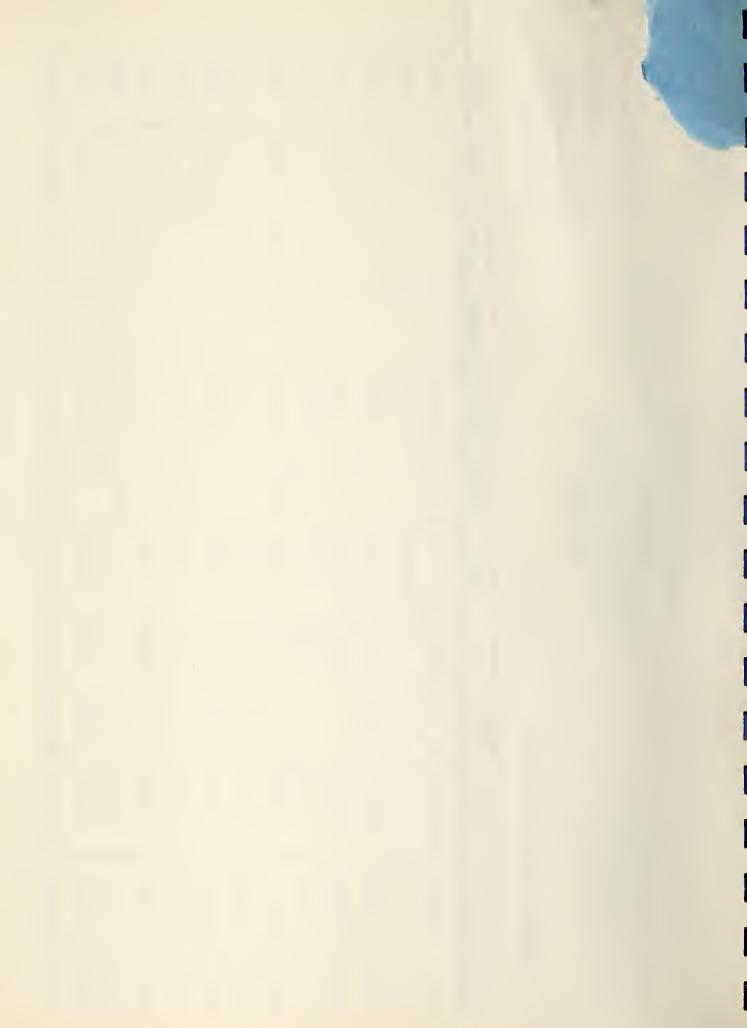
BUDGET 10,000.00 100

ACTUAL 8,458.91 85

WMRW/UNDER 1,541.09 15

PROJECT: HUNTSVILLE 58-5-15

SUNDRY	\$ 14.45	21.83	83.84	75,40	17.20	194.76	195.35	278.69	176.20	36.37	380,60	136.51	\$1,611.20
WATER	(A	6.50		7.00		21.00		115.85		70.05		35.10	\$255.50
REPAIR & MAINT.	↔				33,30	21,60	37.11				15.17		\$107.18
EQU I PMENT	-				41.20	139.00							\$180,20
GENERAL SUPPLIES	\$ 22.98	21.93	19.50	6.12	34.83	59.69	85.86	87.32	8.74	56.51	33.21	56.42	\$463.18
CHEMICAL	₩					465.40					(243.25)		\$222.15
POWER	↔	100.77	89.76	19.98	82.16	77.66	82.07	60.96	102,15	95.90	29.06	191.47	\$1,095.25
FUEL	\$104.55		68.70	63.30	55.20	37.30	33.30	22.00	20.57	23.65	25.70	33.60	\$487.87
CASUAL	₩		40.50				36.75	52.50			144.84	39.80	\$314.39
PAYROLL	\$ 264.16	264,16	264.16	264.16	264,16	379.52	283.74	425.61	283.74	283.74	283.74	461.10	\$3,721.99
EXPENDITURE	\$ 406.14	415.19	94.995	502.59	528.05	1,365.93	754.18	1,078.00	04.165	566.22	730.68	954.07	\$8,458.91
MONTH	JAN。	FEB.	MARCH	APRIL	MAY	JUNE	JULY	AUG.	SEPT。	OCT.	NOV.	DEC	TOTAL



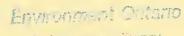




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